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भाग 1 ज्यामितीय परिशुद्धता का परीक्षण चार्ट

Indian Standard

HYDRAULIC PRESSES — STRAIGHT SIDED COLUMN/C-FRAME TYPE

PART 1 TEST CHART FOR GEOMETRICAL ACCURACY

ICS 25.120.10

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

December 2000

Price Group 3

Metal Forming Machines Sectional Committee, BP 04

FOREWORD

This Indian Standard (Part 1) was adopted by the Bureau of Indian Standards, after the draft finalized by the Metal Forming Machines Sectional Committee had been approved by the Basic and Production Engineering Division Council.

The various requirements of these straight sided hydraulic presses are covered in following three parts:

Part 1	Geometrical accuracy
Part 2	Performance test
Part 3	Deflection requirements

This standard (Part 1) has been prepared based on the expertise available in the Indian industry, however assistance has been derived from JIS b 6403 : 1973 'Test code for performance and accuracy for hydraulic presses' issued by Japanese Industrial Standard Committee (JIS).

The other two parts of this standard are under process.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed, or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

HYDRAULIC PRESSES — STRAIGHT SIDED COLUMN/C-FRAME TYPE

PART 1 TEST CHART FOR GEOMETRICAL ACCURACY

1 SCOPE

1.1 This standard (Part 1) describes geometrical tests on straight sided column/C-frame type hydraulic presses and corresponding permissible deviations.

1.2 This however does not apply to horizontal presses, column type/C-frame presses without slide guides or presses of special structure such as powder shaping, forging presses, press brakes, moving ram type presses and presses equipped with an automatic feed mechanism.

1.3 This standard deals only with verification of accuracy and does not apply to running tests of the presses (vibrations, abnormal noise, electrical equipment, etc) and machine characteristics such as capacities, speeds which shall be generally checked before testing the accuracy.

2 REFERENCE

The Indian Standard IS 2063 : 1988 'Acceptance code for machine tools — Geometric accuracy of machines operating under no-load or finishing conditions (*first revision*)' is a necessary adjunct to this standard.

3 PRELIMINARY REMARKS

3.1 To apply these tests, reference shall be made to IS 2063 for description of measuring methods and recommended precision concerning equipments.

3.2 The sequence in which the tests have been given in the standard is not obligatory, if necessary, the sequence may be changed to suit the convenience of the inspector. However, test is to be carried out first always.

3.3 When inspecting a press, it is necessary to carry out all tests described in this standard, excepting those tests which may be omitted in mutual agreement between the buyer and the manufacturer.

4 NOMENCLATURE

4.1 Slide — Table fitted to the main ram which moves up and down in the press.

In case of double action presses, slide refers to both the slides namely, inner and outer and measurements are to be taken with respect to both.

4.2 Bolster — The bottom table which can be fixed or removable type and on which tools are mounted.

4.3 Supporting Rod — It is a fixture to support dead weight of side and its length can be arbitrary. The top end of supporting rod which comes in contact with the lower face of slide, shall have a structure just as a ball joint to enable it to move freely.

4.4 Length ***L*** — This refers to longer side measurement either in left to right or front to back, as the case may be.

5 TESTING INSTRUMENTS

5.1 The testing instruments shall be of approved type and shall be calibrated at a recognized temperature conforming to relevant Indian Standards.

6 ACCURACY REQUIREMENT

6.1 The test to be carried out, the instrument required the maximum permissible errors and the manner of carrying out the tests shall be as detailed in the test chart.

6.2 Before carrying out the tests, the machine shall be levelled in accordance with the manufacturer's instructions which should be supplied in sufficient details with each machine.

6.3 The slide guide surface shall be in condition capable of holding adequate oil film.

7 GRADING

7.1 The accuracy of the presses is classified into 3 grades namely Grade 1, Grade 2 and Grade 3. The representative uses applicable to the different grades are shown in Table 1.

Table 1 Classification of Accuracy of Hydraulic Presses

(*Clause* 7.1)

Grade	Uses	Representative Types of Press
Grade 1	Precision forming	Straight side press, C-frame press (requiring particularly high precision)
Grade 2	Regular forming	Straight side press, column type press (requiring particularly high precision), C-frame press
Grade 3	Regular sheet metal work	Column type forming, C-frame press

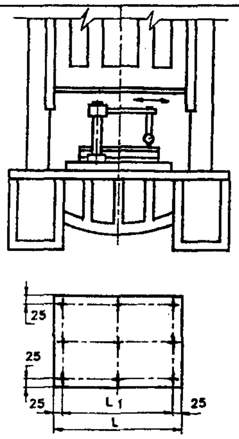
TEST CHART FOR STRAIGHT SIDED COLUMN/C-FRAME TYPE HYDRAULIC PRESSES

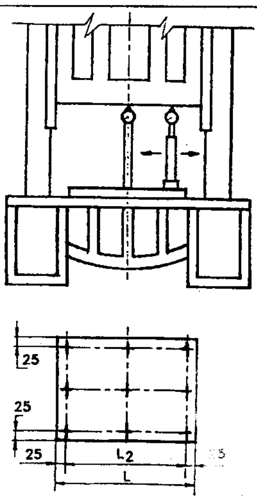
Type ______________ Order No. ______________ Customer ______________

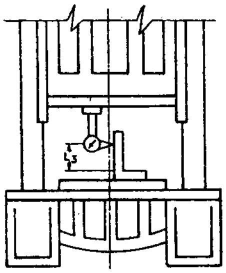
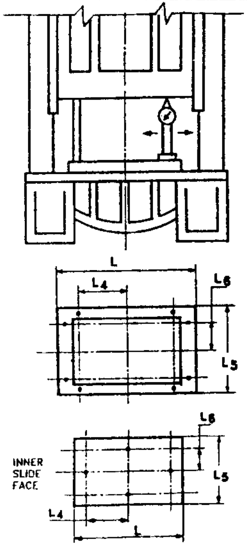
Machine No. ______________ Date ______________ Inspector ______________

GEOMETRICAL TEST

All dimensions in millimetres.

Sl No. (1)	*Figure* (2)	*Object* (3)	*Measuring Instruments* (4)	*Instructions for Testing* (5)	*Permissible Deviations* (6)	*Actual Error* (7)
1.		Flatness of the upper surface of bolster (or the bed) and lower face of slide in *L* to *R* and *F* to *B* directions	Straight edge and dial gauge	a) Place the straight edge along in the centre and the two sides of upper face of bolster (or the bed). Take a dial gauge, apply it to straight edge the bolster (or the bed) to take readings at least at 3 places, namely centre and two edges. Repeat the readings by placing straight edge in other plane. The maximum difference between any two readings shall be the measured value.	Grade 1 $0.015+\frac{0.04\times L_1}{1000}$ Grade 2 $0.03+\frac{0.06\times L_1}{1000}$ Grade 3 $0.06+\frac{0.08\times L_1}{1000}$	Measured length L_1 = ... Measured deviation = ...

Sl No. (1)	*Figure* (2)	*Object* (3)	*Measuring Instruments* (4)	*Instructions for Testing* (5)	*Permissible Deviations* (6)	*Actual Error* (7)
				b) For checking flatness of slide repeat above exercise by placing the edge and dial gauge on slide. The maximum difference between any two readings is the measured value. NOTE — L_1 indicates measured length in mm. $L_1 - L$-50, where L is longer side of upper surface of bolster (or the bed).	Permissible deviation = ...mm	
2.		Parallelism between lower face of the slide and upper face of the bolster (or the bed) in *L* to *R* and *F* to *B* directions	Dial gauge	Support the approximately centre of the lower face of slide(s) with supporting rod(s). Measure the interval between the upper face of bolster (or the bed) and the lower face of slide) (or the blank holder) at least at 4 points as shown in figure. Do not measure along the diagonals. Also measurement is to be taken at two positions namely at the lower limit of the strike and at 1/3rd of the way up from the lower limit of the stroke. NOTE — L_2 indicates the measured length in mm. $L_2 = L$–50 of the lower face of the slide, where L is the longer length either L to R or F to B. In case of C-frame press, the front shall not be opened.	Grade 1 $0.03+\frac{0.08\times L_2}{1\,000}$ but not less than 0.06 Grade 2 $0.06+\frac{0.12\times L_2}{1\,000}$ but not less than 0.12 Grade 3 $0.12+\frac{0.17\times L_2}{1\,000}$ but not less than 0.20 Permissible deviation = ...	Measured length L_2 = ... Measured deviation = ...

Sl No. (1)	*Figure* (2)	*Object* (3)	*Measuring Instruments* (4)	*Instructions for Testing* (5)	*Permissible Deviations* (6)	*Actual Error* (7)
3.		Perpendicularity between verticle movement of slide and upper surface of bolster (or the bed) in *L* to *R* and *F* to *B* directions	Dial gauge and engineer's square	Place engineer's square in approximately centre of bolster (or the bed) a fix dial gauge on top slide so that it touches the vertical edge of square. The measurement value shall be the maximum difference between any two readings. The range of measurement should be lower half of the stroke of vertical slide. NOTE — L_3 indicates the slide stroke in mm.	Grade 1 $0.02+\frac{0.015\times L_3}{100}$ but not less than 0.035 Grade 2 $0.04+\frac{0.025\times L_3}{100}$ but not less than 0.065 Grade 3 $0.10+\frac{0.03\times L_3}{100}$ but not less than 0.13 Permissible deviation = ...	Measured length L_3 = ... Measured deviation = ...
4.	 L L_4 L_6 L_5 L_6 INNER SLIDE FACE L_5 L_4 L	Parallelism of lower face of slide with respect to upper face of the bolster (or the bed) due to eccentricity (clearance in guides) in *L* to *R* and *F* to *B* directions	Dial gauge	Support the lower face of slide approximately centre with supporting rod by placing it at points whose distances from the centre are 1/3rd of the lengths of the respective slides of the lower surface of the slide(s), as shown in figure. Measure the gap between the lower surface of slide and the upper surface of bolster or bed with dial gauge. The maximum difference between two readings is the measured value. Do not measure along diagonals. Also the measurement shall be taken at two positions namely at lower	Grade 1 $\frac{L_4}{3\,000}$ Grade 2 $\frac{L_4}{2\,000}$ Grade 3 $\frac{L_4}{1\,000}$ Permissible deviation = ...	Measured length L_4 = ... Measured deviation = ...

Sl No. (1)	*Figure* (2)	*Object* (3)	*Measuring Instruments* (4)	*Instructions for Testing* (5)	*Permissible Deviations* (6)	*Actual Error* (7)
				limit of the stroke and 1/3rd way up from lower limit of stroke, as shown in figure. NOTE — L_4 indicates the length in mm. $L_4 = 1/3 \times L$ and $L_6 = 1/3 \times L_5$, where L_5 is the width being measured for slide.		

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